

1 Blurring boundaries and the erosion of ownership

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Abstract

Experiencing ownership is central to what it means to be human and it is central to the functioning of societies. One notion that is inherently tied to ownership is the notion of boundaries around the owned target and between owners and non-owners. These boundaries enable humans to claim, to exert control over and to take responsibility for that which is owned. All of which are necessary to motivate and enable sustainable behaviors.

In this contribution I highlight ways in which current societal and technological trends, in particular the fast paced movement towards encompassing digitalization of life, erode the boundaries necessary for the experience of ownership. I further discuss how this erosion may not only hamper feelings of ownership but even go so far as to shift the perception of humans from owners to those being owned; thus, undermining humans perceived capability as responsible agents. In response I suggest a necessary transformation in terms of digital boundaries and empowerment, potentially taking the shape of digital blueprints and agents.

1.1 Boundaries and ownership: an illustration

In this chapter I propose that we are in the midst of a subtle but significant transformation to the social fabric of mankind. My main argument is that easily perceptible boundaries disappear and that this in turn affects a fundamental human experience, that of ownership.

To pave the way for this argument it is helpful to hold an intuitive understanding of the powerful notions of ownership and boundaries. To illustrate this notion, imagine the following situation:

One day you decide to attend a public lecture. You arrive well in time and are among the first to enter the lecture hall. Row upon row chairs are arrayed in a semi-circle around the podium. You walk into the room and pick one of the chairs. You sit down and make yourself comfortable. You have barely sat down when you start to crave a drink. People are only just beginning to file in. So there is enough time to go outside and get yourself a drink before the talk begins. You stand up, take your wallet but leave your jacket on the seat you picked.

A few minutes later you return with a drink in hand. You look out for the chair with your jacket and you find that the chair you originally picked is now occupied by another person. Your jacket has been moved one seat further.

What goes through your mind in that moment?

Most people spontaneously react by thinking or even saying: "Hey! That is MY chair!". Notably and though it may be deeply felt, this statement is devoid of any legal entitlement. Attendees of a lecture do not usually hold any claim to a particular seat and are certainly far from legally owning a specific chair. Yet, in this situation most people will nonetheless feel that someone else has trespassed on their possession. They feel like they own the particular chair in the lecture hall. This experience of "psychological ownership" (PO) determines their emotional reaction and their behavioral response.

This simple example demonstrates the first key concept of this chapter: ownership as a psychological experience. PO is a powerful force that shapes human behavior (Kamleitner, 2014; Pierce & Jussila, 2011). At its core it refers to the extent to which people feel possessive about and claim something for themselves. Whether or not they do so for a particular target, is much more than a mere reflection of enforceable legal entitlements (Etzioni, 1991; Pierce, Kostova, & Dirks, 2003).

The second key construct of this chapter is the notion of boundaries. This notion is a necessary precondition for experiences of ownership to emerge. A slight variation to the above example serves to illustrate this point.

Imagine the above situation with one notable difference. Rather than featuring individual chairs, the lecture hall features long, uninterrupted benches. Of course everyone still has to choose a seat. So when coming in, again being a few minutes early, you search for a suitable spot on the bench in the row you most like. You find the ideal spot, seat down, get thirsty, and drop your jacket on that exact spot before leaving the room to get a drink. You come back and again your jacket has been moved roughly one seat further.

Would your reaction still be the same? Would you have an equally strong sense of having been wronged, of somebody infringing your territory?

While potentially still being annoyed, most people would not mind as strongly. What was an absolute break of a moral code in the case of taking "someone else's" chair, is not quite so condemnable in case of taking someone else's space on a bench. In other words, even if we go to the same lecture, pay the same price for a ticket, pick the exact same spot in the room and use the same instrument to mark a territory (i.e. a jacket), we feel and behave less like an owner for the same spot in the room when it is embodied as a seat on a bench than on a chair. The reason can be found in the notion of boundaries.

Chairs are self-contained seating units of one. Their boundaries clearly denote a seat meant to be used by one individual. In contrast, benches often do not denote the specific boundary between one seat and another. They are seating units meant for more than one person and they do not necessarily indicate where one particular seat ends and another begins. The lack of physical evidence of a specific boundary makes it harder for us to claim a specific spot. Simultaneously and even if such claims are made, e.g. by leaving a jacket, others feel less compelled to respect them and we are less likely to defend them. It feels more acceptable to push somebody else or her belongings to another spot when one does not have to cross a boundary than when a boundary is present. People are more likely to dare to claim, experience and defend ownership for things with a boundary. We often need boundaries and hold an inherent respect for them. This basic principle is the phenomenological backbone of this contribution. I translate it to the context of increasing digitalization and thus show how this development may be more deeply transformative than most of us may thus far have realized.

This argument is developed in four steps. The first step focuses on the notion of ownership, its essential role in the human condition and its critical dependence on the existence of boundaries. The second step focuses on the notion of boundaries and on how they become blurred in the context of an increasingly digital society which reigns in the age of information. The third step focuses on what happens when the two first steps are being brought together. Specifically, it analyses how the described shifts may raise questions related to the experience of owning oneself and of attributing responsibilities. The fourth and final step concludes this chapter by focusing on the possibility of developing novel mechanisms of boundary construction in the form of digital blueprints and agents.

1.2 Why ownership matters and how it comes about

1.2.1 The importance of psychological ownership (PO)

The **human condition** is characterized by interactions with the material world. We regularly encounter and interact with man-made and natural artifacts, natural beings such as pets and intellectual artifacts such as poems. A key experience that informs the way in which we interact with all of these entities is the experience of ownership. When I refer to ownership I refer to ownership as an experience, as what we mean when we say this is my chair or this is your book. I do not delve into questions of actual legal entitlement. Although legal ownership often closely follows the human experience of ownership. It is possible to legally own things but to feel and experience no ownership for them. The type of ownership

I refer to is the type of ownership that we intuitively perceive and understand without needing to first read contracts, deeds or law books.

The experience of ownership is a truly powerful phenomenon because it has both a group level social and an individual level psychological facet. On the one side ownership is social. It entails the attribution of an object to specific people and sends strong signals to others. Because of this, ownership holds a key role in facilitating social interactions (Rudmin, 1986, 1988).

On the other side ownership is individual and subjective. It is the experience of a specific connection between an object and the self. It thus also sends strong signals to ourselves. Because of this, ownership also holds a key role in generating self-experienced identities (Weiss & Johar, 2016).

It thus may come as no surprise that, across cultures, ownership tends to be the first socio-economic concept children learn to understand (Furby, 1980; Nancekivell, Van de Vondervoort, & Friedman, 2013). Due to its dual nature ownership serves several important functions and affects us incessantly (Russell W Belk, 1991; Friedman & Ross, 2011). For example, through the things we own we are able to affect the world around us more effectively than we could with our own bodily capabilities alone (White, 1959). Because we constantly attribute objects to owners, we know what to touch and what not to touch, thus avoiding constant fights over attractive objects (Rudmin, 2016). Because we can attribute ownership of objects to ourselves, we can use these objects to shape or reaffirm our identity (Russell W. Belk, 1988). Further, and as illustrated in the introductory example, attributing ownership to ourselves guides our emotional and behavioral reactions whenever something happens to an object (Pesowski & Friedman, 2015). If it is ours we care for it and try to protect it (Kamleitner & Rabinovich, 2010), thus potentially ensuring sustainable object use. Perhaps most importantly perceptions of ownership empower and compel people to act. This is because ownership encompasses both socially accepted rights and obligations (Pierce et al., 2003; Sartre, 1992). It is the owner's right to dye his poodle pink but it is also the owner's duty to make sure that the thus dyed poodle does not cause an accident. Ownership determines who can do what and, thus, clearly distinguishes owners from non-owners. While the owner can allow others rights of use, e.g. the permission to pet the poodle, he may also deny them. The concept of ownership is so deeply ingrained in us that we automatically respect the rights and obligations it entails. We constantly encounter multiple objects. It is down to the force of ownership that we are nonetheless rarely ever tempted to interfere with what is not ours but also barely ever consider abandoning what is ours.

Though the functions of ownership are manifold many of them can be condensed into one key term: responsibility. Experiences of ownership entail the acknowledgement and attribution of responsibilities (Furby, 1978; Palamar, Le, & Friedman, 2012; Pierce et al., 2003; Van Dyne & Pierce, 2004). As for example the tragedy of the commons, which tends to befall public goods, shows resources that are not attributed to a specific owner are prone to be used irresponsibly and unsustainably. Though ownership entails the right to destroy objects, once people feel a sense of ownership it leads to the opposite with people becoming more appreciative (Beggan, 1992; Loewenstein & Adler, 1995; Strahilevitz & Loewenstein, 1998) and protective (Kamleitner & Rabinovich, 2010) of what they own. Owners struggle to let go or destroy their possessions (Haws, Reczek, Coulter, & Bearden, 2012; Trudel, Argo, & Meng, 2016; Winterich, Reczek, & Irwin, 2017) and even possessions owned by others accrue a protective halo.

1.2.2 The routes to PO and their dependence on boundaries

Theoretically, ownership, in the sense of PO, can be experienced for anything that people can call "MY" (Kamleitner, 2014). "This is my....!" can be used to refer to and thus signal feelings of ownership for organizations, jobs, projects, brands and even ideas (Baer & Brown, 2012).

Although people can theoretically appropriate a lot, by far not everything becomes psychologically appropriated. Whether or not a specific target becomes appropriated depends on two things: the target itself and the experiences one makes with this target. Notably, the type of target determines what experiences one can make with the target. For example, due to a differences in weight people have a harder time carrying around their pony than carrying around their poodle. In essence the

enablers of PO, i.e. the characteristics of the target and the experiences with the target, are intertwined. I first outline the characteristics targets need to have to allow for psychological appropriation and show that boundaries are central. I will then discuss the processes needed and show how these processes are crucially enabled by the presence of boundaries.

PO constitutes a relationship that a person, in most cases, willingly enters (Kamleitner, 2014; Pierce et al., 2003). For her to desire and attempt psychological appropriation the target needs to be a) desirable in that it attracts the person and is also somewhat meaningful to her, b) non-fungible, in that the person can feel that it is easiest to bond to specific targets that one can leave a trace on and mark as one's own, and c) claimable, in that it allows for the experiences necessary to develop psychological ownership (Kamleitner & Mitchell, forthcoming).

This last aspect of claimability is the perhaps most essential target characteristic. It is impossible to develop a sense of ownership for a target without holding at least the illusion of being able to somewhat claim it. To claim something, however, necessitates some idea of what that something is. Unless a person holds a clear notion of what it is she wants to claim she will struggle to fully appropriate it. And this is where the notion of boundaries moves centre stage. The perception and understanding or even the mapping of its boundaries are a needed precondition for truly claiming a target. This becomes perhaps most evident in the context of land. Early settlers literally claimed land for themselves by marking boundaries around them (D. W. Allen, 1991). Maps hold great political and economic power because they draw boundaries that build the basis for territorial claims of ownership (Wood & Fels, 1992). From a social perspective, boundaries are what helps us to determine where one person's possessions end and where another person's possessions begin. They are what people fight over in ownership disputes while simultaneously being the easily observable lines most people otherwise intuitively respect. Blurred or lacking boundaries unhinge the social functions of ownership.

In addition and as I will next outline, boundaries are needed for the experiences and processes people engage in when psychologically appropriating, and claiming, a target. In the most influential contribution to the literature on PO Pierce et al. (2003) have stipulated three generic processes, called "routes", through which people become psychological owners. Empirically these routes somewhat overlap but each of them has its own phenomenological core. To psychologically signal a claim over a target to oneself, people need to be able to freely walk at least some of these routes and, as I shall outline, the lack of boundaries keeps them from doing so in all cases.

The first route is intimate knowledge. The more a person feels to intimately know a target, the more she figuratively "grasps" and, in turn, claims it. But how does one know whether and to what degree one intimately knows a target? Usually this happens by comparing what one knows to what one feels to not yet know or to what others appear to know. The higher the perceived proportion of knowing to not knowing, the more one feels to know about something (for how this might be biased by one's initial level of ignorance see the so called Dunning-Kruger effect; Kruger & Dunning, 1999). This works quite well if the target is well specified, for example a particular song. In this case one knows that one knows; or not. The less specified a target becomes, the harder it becomes to know what one knows. For example, it is much easier to feel intimately knowledgeable about a particular song than an entire album; than the music available in a cloud service. The more blurred the boundaries of a target are, the harder this process of intimate knowledge becomes. It is impossible to feel to really know a thing without knowing where it ends and thus what it is.

The second route to PO is personal investment. The more a person feels to invest herself, in terms of time, energy or even money, the more likely she is to develop a sense of ownership for what she has invested in. For example, putting effort into an object by individualizing it increases PO (Fuchs, Prandelli, & Schreier, 2010). Even payment methods may affect PO. In field and lab settings we found that paying in cash leads to more PO for accessories and clothing than paying by card (Kamleitner & Erki, 2013). This is because handling coins and bills embodies the investment and makes it thus particularly salient. Notably, it helps the generation of PO if we see our investment reflected in the target. If the investment left traces on the target or was even crucial for its generation (Levene, Starmans, & Friedman, 2015). As for knowledge, this process is contingent on the existence of boundaries around a target. For example, people also have an easier time to develop PO for a song on a music disk than the same song in the cloud because they invest more labor into getting the disk

out of its cover and putting it into a music player than pressing a button on a device. Moreover, the cover will start to show traces of their use sending yet another signal of their investment and appropriation. Unless we know the contours of a target, it is hard to know what role one's investment has played for the target. A boundless target becomes like a black hole that eats up whatever is put into it without showing any evidence of this having happened.

The concurrence of boundaries and the conditions necessary for the development of PO becomes perhaps most visible for the third and most fundamental route to PO, the experience of control (Furby, 1980). By controlling objects, humans can significantly extend their capabilities beyond their own bodily and mental restrictions (cf. Beggan, 1991; Prelinger, 1959a). For example, we can use a stick to push things that our own reach would not allow us getting to, we can use tweezers to hold things that our fingers would be too clumsy to grasp, we can use binoculars to see what otherwise would be invisible to us and we can use calculators to do mathematical operations that we would struggle to do unaided. The experience of control over a target paves the way for us being able to truly use it for our aims and it thus also precedes psychological appropriation. For example, in contrast to a song in the cloud the same song on a vinyl can be better controlled. We control both the physical carrier of the song, the vinyl, the player we put the vinyl in it and the song itself by adjusting the settings of the player. As for the prior routes, the absence of boundaries hampers people's ability to control things. It is hard to experience full control of something, if it remains unclear what that something is.

In a nutshell the emergence of ownership in both its facets, the attribution and respect of ownership through other people and the self-centered experience of ownership in the form of PO, are contingent on the perception of boundaries. Psychologically comprehensible experiences of ownership can only fully evolve for objects that people can reasonably claim in ways that they can feel themselves and that are also perceivable by the outside world.

1.3 Boundaries and their demise in an increasingly digital world

1.3.1 The orienting force of boundaries

Boundaries help us to categorize, structure and thus make sense of the world (Harnad, 1987; Neuberg & Newsom, 1993). The notion of "boundary" as I am using it here refers to the demarcation of a unit from other units. Knowing the boundary of something means being able to describe the contents falling within that boundary and being able to tell when something is no longer part of it. Boundaries thus signal where something begins and ends. In the context of physical objects, boundaries tend to be naturally present and come as visual and haptic contours that are easy to perceive and trace. Owners will often work on those boundaries whenever they aim to grow a possession or share it with others, such as in the case of splitting land into several plots, adding another level onto a house or splitting a cake into several pieces. In the context of non-tangibles, boundaries become somewhat hard to determine but can generally be found where we distinguish between one concept, e.g., one idea, and another. For goods such as information boundary work becomes an essential task for those owning the information (Petronio, 2015; Petronio & Petronio, 2000). In these contexts boundaries are not always naturally present and need to be created to define a unit, such as happens when splitting a story into several sequels.

Human perception is attuned to identifying boundaries (Grossberg & Mingolla, 1985). Boundaries help in our eternal quest to understand the world we find ourselves in. In general, humans thus welcome and readily create boundaries. Boundaries provide a sense of security and structure and thus help people navigate through the world (Neuberg & Newsom, 1993). In short, boundaries provide orientation.

Boundaries send clear signals about what one deals with and as a consequence provide the individual with guidance on how to act. Mostly this happens in conjunction with automatic attributions of ownership. To illustrate, consider the following figurative example: a line on the floor around a house signals the limits of this property. People will immediately know what to do. They will refrain from

crossing this line but assuredly walk along it. If aiming to cross this boundary they also know what to do, i.e. search for and ring the bell. Similarly the person residing within that line knows that within that space she holds a large degree of freedom in how to behave and shape the premises. Once people perceive a boundary, they can start to attribute ownership and gain certainty on how to act. In particular, they can start to inter-act with the bounded entity. If people fail to perceive and experience boundaries, it impedes their ability to act because they have only a limited sense of what it is they interact with and do not even start to pose questions of ownership attribution.

Obviously, not every boundary is welcome. Boundaries also act and can be perceived as a barrier. Whenever people feel that boundaries unduly constrain them and their actions, they are prone to rebel against and trespass them (Brehm, 1966; Laurin, Kay, & Fitzsimons, 2012). Notably, even this rebellion is predicated on the perception and experience of boundaries. It takes knowing where the boundary is to consciously step over it. It is this experience and perception of boundaries that I argue is becoming gradually hampered by the increase in digitalization.

1.3.2 Boundaries and dynamics of a digital society

In the last decades we have seen an impressive rise in digitalization. With developments such as online shopping, music streaming, and sharing platforms digitalization has affected businesses and consumers alike. It has even had a substantial effect on non-commercial spheres, in particular on the way we communicate with each other and who we communicate with. Given its ubiquitous prevalence and the degree to which it is changing the very structure of various domains, digitalization amounts to a substantive transformation. This transformation is embedded in broader societal dynamics. Many of these dynamics involve a demise of boundaries. I briefly outline some key dynamics and how they blur boundaries.

The first and perhaps most important of these dynamics has been a shift towards an exaggeration of the value of convenience (Tierney, 1993). Convenience and comfort have become ultimate selling points (Lin, Marshall, & Dawson, 2013; Shove, 2004). Gains in them are characteristic of most new releases and innovations. Data-driven products enable an unprecedented opportunity of maximizing user convenience. Boundaries can serve as obstacles that jeopardize convenience. Their demise thus not only accidentally happens due to the rise of ubiquitous IT based control, their demise is a societally acclaimed goal. The perhaps most clear example of this are cloud-based services that boom to a large part because they enable a freedom of access devoid of geographical, device-based or temporal boundaries. Provided there is access to the world-wide and seemingly infinite web, we can listen to our music or view the pictures of our last holiday wherever we are and whatever device we happen to have with us. More and more products and services become available in an intangible form. For these, we have moved beyond the restrictions that tangibility entails. This is extremely convenient and because it is so easy for us we may feel like being in total control. However, it also reduces the need and even opportunity for deeper engagement with objects. For example, we no longer have to find a "place" for objects and thus also do not really know where they are. In a nutshell, we cannot feel these objects becoming or being part of our possessions which entails that we experience less PO for a digital (e.g., an e-book) as compared to an equivalent tangible product (Atasoy & Morewedge, 2016).

A specific development affecting all types of products and services simultaneously is convenience with regard to payment methods. With NFC (i.e. near field communication) payment devices being on the rise, the transfer of money happens without us seeing it cross any boundaries. This saves time but it also means that investments, as one route towards PO, become less and less salient. Interestingly, via digitalization's effect on payment methods it also affects and reduces our appropriation work when obtaining tangibles. Every increase in comfort and convenience facilitates quick gains in perceptions of control (Baxter, Aurisicchio, & Childs, 2015) but is at the same time a reduction in the effort needed to claim an object.

The age of information is not only accompanied by an increase in the value attached to convenience it is also characterized by a worshipping of choice which has been stylized as the epitome of freedom

(Schwartz, 2000). Exerting that freedom entails the act of choosing, not the choice itself. Consequently and slowly following the spreading of the values giving rise to it, markets have come up with new ways of maximizing the opportunities for people to engage in that act. Conventional ownership binds resources and thus restricts the scope for future acquisitions and market choices. It is getting out of vogue. Acquiring things for temporary use has become fashionable and the so called sharing economy is rapidly on the rise (Hamari, Sjöklint, & Ukkonen, 2016). The partly superficial but societally agreed selling point: "Use rather than own" as a promising way towards more sustainable resource use (Leismann, Schmitt, Rohn, & Baedeker, 2013). In this context digitalization has been rightly heralded as the ultimate enabler of more sustainable and connected practices of consumption.

What this development ultimately means is that—in an increasing amount of domains—people strive less and less to draw boundaries around the things they interact with. From the outset they know themselves as users rather than owners and they behave accordingly (Bardhi & Eckhardt, 2012)

1.3.3 Boundaries and data-driven systems

All of the above dynamics are due to the emergence of new systems where different actors, machines, devices and processes become increasingly connected. These systems dynamically evolve and are gaining in complexity which means that their boundaries constantly change and are thus blurry. Moreover these systems are propelled by equally growing streams of data flow. The digital transformation has become possible because we have found new ways to deal with, collect, connect and store data. The transformation is thus fueled by something that is in itself hard to pinpoint as it lacks clear cut boundaries. I shall first outline the phenomenon of networks and systems before delving into the very matter of data. In both cases I attest to a lack of easily graspable boundaries.

Networks and systems. Already, every domain of life has been at least touched by data-driven systems, and some have started to talk about 'ubiquitous' IT-based control (Leclercq-Vandelannoitte, 2017). The prevalence of IT-based, data-driven systems has increased exponentially and keeps being on the rise (Buhl, 2013; Haris, Haddadi, & Hui, 2014). For example, data accrued from the use of loyalty cards are used to predict and steer what ends up in a person's online and offline shopping baskets. Likes on social media are used to infer a person's susceptibility to political messages. Tracking devices in cars collect driving data that are then used to determine insurance rates. In an attempt to maximize romantic success on dating platforms, algorithms infer a person's personality characteristics from a whole range of available data traces. Wearables track a person's physical parameters to advice on health issues, and even parents increasingly trust in digital devices to monitor their children's health and whereabouts. Things become "artificially" intelligent and the word "smart" precedes ever more products and it nearly exclusively denotes a device or service as being capable of sensing its environment and operating based on automated and often incessant data input.

To fully unfold their power, such data-driven products and services depend on steadily accumulating data flows. These flows allow them to algorithmically optimize preprogramed goals. For example, to fully develop its potential, a smart lighting system would need to detect what outside lighting conditions are like, what time of day it is, who has entered a room, what mood those people are in and what they are likely to do next. If it infers that Susan just entered the room and wants to do some reading to unwind after a stressful day, the truly smart system would automatically activate the reading lamp with calming hues and adjust the quality of light emitted based on how tired she appears to get.

Even if smart, the lighting system by itself will likely not be able to sense all the necessary information by itself. To become truly "smart", it needs to communicate with other things that complement or even fully provide the information necessary for optimized, personalized lighting conditions. It may, for example, need to communicate with a wearable monitoring Susan's physical condition and with smart phone apps that listened in and understood when Susan mentioned earlier that day that she would like to read in the evening.

With the internet of things (IoT) or even the internet of everything (IoE), and interfaces like the Amazon Echo System being on the rise, the described scenario of a smart lighting system is plausible. On the one side this raises obvious questions around privacy and technological dependence that have been

discussed elsewhere (for examples from different disciplines see Acquisti, Brandimarte, & Loewenstein, 2015; Bélanger & Crossler, 2011; Christl & Spiekermann, 2016; Etzioni, 2015; Leclercq-Vandelannoitte, 2017; Rauhofer, 2008; Smith, Dinev, & Xu, 2011; Tene & Polonetsky, 2012). On the other hand, and of prime interest here, these developments affect the very fabric of those aspects of the world we regularly interact with. This comprises the objects and systems that accompany and facilitate everyday behaviors, the means we use to communicate and, increasingly, even humans themselves.

As illustrated in the example of smart lighting, ubiquitous IT connects entities that used to stand alone. For example, rather than just being a fridge, a smart fridge also serves as a shopping list and may automatically communicate with an online food delivery service. It thus is fridge and shopping assistant in one. If the fridge then also links with a fitness or health tracking app, tracking what types of food a person reacts to particularly strongly, it may even evolve into part-time nutritionist. The smart phone hosting those apps would then also serve as part-time nutritionist on top of being personal assistant, alarm clock, navigator, guardian of the home surveillance system and most trusted DJ.

The more the different devices and applications become connected, the more their own boundaries blur. Viewing them as individual gadgets no longer does justice to them. They are no longer sufficiently bounded to be an independent unit of one. Rather they become integral parts of a complex, expanding network and need to be thought of as systems rather than entities (Hoffman & Novak, 2015; Verhoef et al., 2017). The complexity inherent to many of those systems and devices entails that most people will struggle to perceive their boundaries, to fully control, to intimately know and to understand many of the products they legally own (Kamleitner, 2017).

Data. Notably, these ubiquitous systems are fueled by data. Data have become the most valuable good (Acquisti, Taylor, & Wagman, 2016; Spiekermann, Böhme, Acquisti, & Hui, 2015).

Unprecedented in history, this is a good that is invisible to the naked eye. Attempting to view data as a market good defies human comprehension in more than one way. Data and the way they are handled makes it very hard to think of them as a concept with boundaries and even personal data thus elude psychological appropriation. This happens on three levels (Kamleitner & Mitchell, forthcoming).

First, the nature of data themselves--in particular their intangibility and invisibility--makes it often hard for people to perceive their boundary. This becomes evident in the music examples I used when illustrating how the lack of boundaries affects the key experiences leading to PO. The lack of visible, tangible boundaries makes it hard to gain intimate knowledge about, see one's investment in and exert control over a purely digital good such as data. Data are thus by their very nature hard to appropriate psychologically.

The second level focuses on the fact that data can exponentially increase in value once they are combined with other data points (for humans general struggle to comprehend exponential growth see Cronin, Gonzalez, & Serman, 2009). For example, knowing the location at which a person has been at 10am and knowing where the same person is 5 minutes later not only provides information about two locations. It also allows inferring whether the person is still engrossed in the same activity or not, how fast she may walk or what means of transport she may have boarded in the meanwhile, and what direction she is moving. Those two data points combined are thus much more valuable and informative than if viewed in isolation. The boundary to the information they provide stretches with every addition and how far it will stretch is hard to say in advance. Even data collectors mostly do not know from the outset what specific, bounded information they may garner from the data they collect. This is aggravated by the fact that the scope of data points collected defies human understanding. Every second of our being can be translated into locations, words spoken, emotional expressions, skin conductance, heart beats, other muscles flexed, and so on. The potential list of data points that can be generated within the span of a breadth is potentially mind-numbing.

On top of these issues and subject of the third level, data markets do little to generate boundaries that facilitates users' grasp of the economic fuel to which they contribute. In most cases, consumers trade data for apps and services without ever being made to fully understand that this is what is going on (Au, Zhou, Huang, & Lie, 2012). As we conclude elsewhere (Kamleitner & Mitchell, forthcoming):

"Together, a range of obscuring market practices, the thorough invisibility of data, the often

limited value they provide to those they are about, and their sheer incomprehensible scope are likely to lie at the heart of why people feel and exert little ownership over a good that is becoming increasingly precious to the market, and whose trade directly affects consumers themselves.”

1.4 Shifting away from being owners

1.4.1 The possibility of being owned

The blurring of boundaries jeopardizes the processes involved in the generation of PO. Domains in which boundaries crumble likely also see a reduction in the degree to which people claim ownership over the targets in that domain. As outlined, modular and structural components of an increasingly digitalized economy and society both entail an erosion of easily graspable boundaries. Its subsequent effect on experiences of ownership emerges subtly but can and already appears to have fundamental consequences.

Here I focus on what I feel to be the most fundamental consequence: a shift from us owning things to us psychologically becoming owned. Before explaining how this shift occurs, it is necessary to pinpoint its basis in the human experience of ownership. There are at least two key pillars that make it possible for us to feel like we are being owned. First, part of our natural development is to take ownership over the self. The very first possessions humans claim is their own body and the notion of ownership rights co-evolves as humans learn to appropriate their body (Van de Vondervoort & Friedman, 2015). Their own body is humans' perhaps most important possession (Kemmerer, 2014; Longo & Haggard, 2012). Body and mind are the tools we use to achieve everything else. The body acts as the initially experienced boundary for what we call the self. Notably, the self is a concept in substantial need of boundaries, both social and psychological but also physical and spatial (Burris & Rempel, 2004). Perhaps surprisingly, given that we have known and controlled it for all our lives, perceptions of ownership over our own body are fairly malleable (Cioffi, Banissy, & Moore, 2016; Samad, Chung, & Shams, 2015; Thakkar, Nichols, McIntosh, & Park, 2011). As a consequence, it cannot be taken for granted that we perceive ourselves as our own sovereigns and owners.

Second, the psychological notion of ownership and its link to the experiences giving rise to it are deeply ingrained into our behavioral and perceptual repertoire. Without paying attention to it, we constantly scan the world for cues that allow us to infer “does this belong?” and “whose is it?”. Once found, we—equally implicitly—react to these cues. This means that we also do not stop from assigning ownership to people and sometimes even feel that people rightly own each other (Starmans & Friedman, 2016). For example, many people feel that their friends should ask them for permission before asking “their” parents for a favor. One feels to hold rights over “one’s” parents, children, partners that other people do not hold. In fact for our loved ones all the routes towards PO are in place. One has invested in them and the relationship, knows them intimately and may even feel to be able to control them. In most cases these ownership claims are minor compared to the ownership rights we attribute a person holding over herself. Though a person feels that this is “my” partner, mostly he will still respect that the partner largely is its own sovereign.

Nonetheless, with these pillars firmly in place there is the possibility of feeling owned; not just by humans but also by objects. In particular, the link between ownership and control plays a role in this. It can go both ways, from the person to the object and vice versa. People can feel controlled themselves and if this happens, they may perceive themselves as being „owned“(Pierce et al., 2003; Prelinger, 1959b). Children, for instance, will readily tell people that they “belong” to their parents, who they experience as being in charge and control of them. Moving beyond the social domain, the perhaps most illustrative example are addictions where people feel that the substance or object they crave and are dependent on, controls them, owns them and becomes their master.

1.4.2 First digital steps towards becoming owned

Largely as a side effect of its key merits, namely convenience and connectedness, the increase in digitalization is paving the way for a change of roles between subjects and objects; of owners and the owned. Up to this point in mankind people tended to know more about the things they used on a daily basis and were better able to control them than vice versa. A conventional fridge or lighting system can defy physical control by breaking or being bulky but it certainly has a hard time taking true control over its owner. Not so with a smart fridge or lighting system. If the fridge learns to know what is good for us, it may end up controlling our diet. Similarly, if the lighting system learns our rhythms, it will make us go to bed when it “thinks” we are tired enough to do so; thus exerting control over our own rhythms and behaviors.

More and more smart devices and systems go beyond making things easier (Mourey, Olson, & Yoon, 2017). They increasingly discharge humans from acting at all. Smart devices often hold more intimate knowledge about their owners than their owners hold about them. As a consequence digitally empowered systems and devices gradually start to acquire the necessary basis to make an ownership claim while simultaneously this basis shrinks for their human users. The autonomous and agentic powers, i.e. the “smartness”, of things simultaneously erode the autonomy and agency of those they are meant to serve. “Smart” essentially also means that things increasingly acquire the basis needed for them to become owners (for experimental evidence on how perceived autonomy makes things less ownable see Starmans & Friedman, 2016).

Notably, the increase in autonomy and agency among things is not unwelcome by those affected. After all, the smart lighting system saves us from an extra journey to the light switch or from needing to ever stumble through the dark. Its very autonomy is the key selling point.

The main promise: You *get more control* over your life by letting me, i.e., the smart thing do your tasks.

What it really means: You get more time for other things by *giving up control* over some of your tasks.

The gain in convenience entailed is certainly real but in many if not most cases it is not a simultaneous true gain in control over our lives. Rather it amounts to a shifting of time from some tasks to others and a new level of object-dependence. This becomes clear any time our smart agents, for now primarily our smartphones or the clouds hosting our digital belongings, crash. These are situations in which people are forced to realize that the perception of control they experienced when getting what they wanted at the press of a button has been somewhat of an illusion. One context in which this has been studied is that of online platforms used to store digital possessions (Molesworth, Watkins, & Denegri-Knott, 2016). Whenever ‘the cloud’ decides to change its policies, visibly exerts rights it actually holds (Rees, 2014) or simply stops working, consumers may have to realize that it is not them having control over their digital possessions but rather the boundless cloud-based service. This may lead to the frustrating and disempowering recognition that they have not been in control all along. Molesworth et al. (2016) describe such constellations as consumer ensnarement where digital possessions remain part of the market rather than moving truly into the private sphere in which the consumer would be the sole wielder of ownership rights. Though consumers may often fail to realize this, their “possession work” (e.g., building digital photo collections) no longer serves to draw a respected boundary around their digital possessions. A boundless third can easily take what consumers thought to be theirs or even an extension of themselves.

The more people delegate control over ever more aspects of their own lives, the more they strengthen objects’ claims over their wielders. One consequence is a shift of responsibilities, i.e. the key force resulting from perceptions of ownership. Rather than feeling responsible for a largely autonomous object, the object becomes responsible for us. Everyday observations suggest that people already happily assign a lot of responsibility for their live to things. One often hears things like “let me ask my calendar whether I can make it”, suggesting that the calendar has the right to dispose of one’s time. Similarly when people run late the obligatory “sorry” is frequently followed by explanations like „my sat nav made me take a wrong turn“. Prime agent is no longer the human but the thing. We subtly but gradually appear to disown ourselves from our own actions. This is potentially harmful for society because weaker perceptions of responsibility reduce prosocial behavior (Winterich & Zhang, 2014).

Notably, this diffusion of responsibility away from human actors does not simply happen within the limits of single incidences. The afore-described overarching dissolve of boundaries entails that responsibilities are directed away from us on a large scale. In a bizarre way people have started to delegate responsibilities and wait to get data-driven suggestions for what to read next, which song to listen to or even what political party to elect. An illustrative phrase in this context is the all too frequent digital message: "We [i.e. the data-based algorithm] thought you might like that". It lies within human nature to observe the "herd" and largely adhere to its recommendations. This has helped us gain sizable survival advantages (Johnson & Earle, 2000). It is worthy of note that the herders we are increasingly following are no longer fellow humans but things.

The diffusion of responsibilities also does not stop at the level of the individual. Businesses and even governments find it totally acceptable to blame the data or the IT system when things go wrong. If things become responsible for organizations, does this then perhaps even mean that systems and things have started to own the human organizations meant to enable prosperous and harmonious interactions among humans?

1.5 Erecting new boundaries? Digital blueprints and agents

At this point in the argument it is helpful to take a step back and remember the prime fuel driving all of this: data. Data-driven devices and processes crucially depend on the data they draw on. Anytime it comes to making decisions for individual humans this also involves data about human behavior and in most cases also some truly personal data, i.e. data that allow inferring information about a specific person. Personal data are the intimate person knowledge that is necessary for the forces of digitalization to control our tasks and potentially even us. Tackling the issue of data thus potentially entails tackling many of the dynamics jeopardizing experiences of ownership and switching our roles from owner to the owned.

One way to prevent becoming controlled without foregoing all the gains in convenience lies in the psychological appropriation of the enabling commodity, i.e. our personal data. This could help alleviate potential problems at their roots. As long as we are true masters of our personal data, we should also have the means of being masters of the things these data help to master. Unfortunately and due to numerous factors, this way out is currently largely barred to us (A. L. Allen, 2016; Purtova, 2014, 2015). At present the nature of data and the way they tend to be handled makes it impossible for us to appropriate all our personal data in their full scope (Kamleitner & Mitchell, forthcoming).

People nonetheless are thought to crave ownership over their personal data (Bélanger & Crossler, 2011) because they feel increasingly vulnerable when noticing how much systems appear to know about them (Gangadharan, 2015). So they might be open for creative solutions to the conundrum. Could there be ways to help people claim ownership over their personal data and thus their increasingly digitalized lives?

One place to search for an answer to this question is the notion of boundaries. If we managed to perceive or even draw a boundary around our personal data, we would have an easier time to psychologically own what lies inside that boundary, i.e. our personal data – the digital reflection of our self. Two mechanisms may help to achieve this (Kamleitner & Mitchell, forthcoming): Digital blueprints of the self and commissioned agents responsible for one's personal data.

Digital blueprints. The notion of digital blueprints aims to help empower people to dare tackle the issue of data ownership. Its starting point is the observation that the data available about us are so manifold and massive that they defy our imagination. They potentially range from our every heartbeat to our shoe size, to every step, to all our friends, to the way we flex our muscles when getting angry. Because people struggle to grasp what this all may mean, they are likely to feel helpless and (motivatedly) ignorant when it comes to their own data. In turn, they fail to support counter movements geared towards putting more control back to users and do thus little to help the political or commercial success of such initiatives. Before this background, the notion of the digital blueprint aims to equip people with a mental frame that pinpoints the phenomenon in an easily graspable manner and may thus ultimately help people to claim their personal data.

Specifically, the digital blueprint is the metaphorically condensation of all a person's data into the figure of a blueprint or instruction manual for that person. Like a building's blueprint our data blueprint explains how we are wired and thus paves the way to reconstruct, improve or sabotage us. This notion of a blueprint may hence serve as a useful metaphor for personal data as a whole (Kamleitner & Mitchell, forthcoming). Essentially, the notion of a blueprint suggests that an alteration of the discourse about personal data may be useful. Doing so could bound the fathomless phenomenon into a well-defined picture that people can understand and talk about. The particular metaphor of a blueprint for the self also imbues this picture with personal relevance. It thus could be a helpful contribution to enlist the support of the broader population in shaping how the digital transformation plays out. It is however restricted to generating awareness.

Data agents. Awareness alone is, however, not sufficient to actually manage the bounty of data fueling the unbounding of ever more aspects of the world. To achieve this, action that actually puts a boundary around personal data is required. As sketched here and outlined in more detail in Kamleitner and Mitchell (forthcoming) individuals are ill equipped to do so and manage their own personal data. Additional help appears needed. A look at other situations in which people struggle to handle multiple things themselves suggests where such help could come from. The enlistment of experts that are available for all consumers may be the most viable solution. Specifically, intermediaries in the form of data agents could manage data on behalf of individuals. Given that current developments are driven by data, systems and algorithms, to be successful "data agents" would likely need to be technological entities themselves. Key would be that they act on behalf of individuals but are, and that is a key difference to existing smart systems, are accountable to the consumer and act based on well-articulated rather than inferred privacy preferences.

1.6 Conclusion

Humans are very good at interacting with clearly delineable, singularized entities that are defined by easily graspable boundaries. The digital transformation implies a simultaneous erosion of easily graspable boundaries and singularized entities. It gets its power from connecting and at the same time blurring things, humans, systems and processes.

The demise of boundaries we currently observe touches nearly every aspect of the world humans interact with. In large part, this development is owed to the fact that the digitalization offers numerous unprecedented opportunities. Because boundaries fall, access to things becomes possible for ever more humans. One example are the so called MOOCs, i.e. massive open online courses such as Coursera. They enable access to education for a virtually unlimited number of people. Because a demise of boundaries speeds up information flows it has also become much easier to diagnose the causes of catastrophes. This potentially allows acting faster than ever before. Moreover, the ever more blurry boundary between humans and things means that things can help fulfill needed social functions. For example, robots can care for the elderly and do so in an emotionally enriching manner.

Notwithstanding all these positive consequences, boundaries are essential when it comes to making sense of the world and knowing one's place in it. There is thus also a much less discussed potential dark side to the falling of boundaries. Privacy is a key word related to this darker side. Without enforceable boundaries, it becomes nearly impossible to uphold a private sphere. Though important, privacy in itself falls substantially short of sketching the breadth of challenges a demise of boundaries entails. In the age of information, objects' and subjects' digital reflections increasingly reign over the analog matter they reflect. These digital reflections are fluid and power a shift of control away from fixed entities towards more fluid networks and systems. Gradually boundaries become permissible or crumble altogether and with them the basis necessary to claim things. Due to the crumbling of boundaries, the experiences allowing for the psychological appropriation of things become compromised. At the same time the underlying developments gradually imbue things with rights and entitlements over us. Humans even become less necessary for fulfilling core emotional functions in societies.

These developments are happening gradually and though we are in the midst of them it is easy to not

notice. Notice them we, however, should. These developments raise important ethical questions that need to be openly negotiated. Can objects be treated like actual owners? To which extent is it acceptable or even desirable to be in the hands of devices? Who can and should take responsibility for what? Is it ethically and legally possible to delegate responsibility for one's own actions? What makes an action one's own action? Does the employment of smart technologies really shift responsibility to the smart machine? If so, when? If, like Cohen (2000) suggests, autonomy requires freedom from monitoring, have we then already lost our autonomy?

All of these questions await tackling and their answers will address the matter of boundaries. However, given that these boundaries are blurry even now they may already defy being named and negotiated in a broader societal discourse. It is before this background that I have suggested the use of a bounded communicative tool, the notion of a person's digital blueprint. Such a tool helps to translate a fathomless bounty of developments into notions that can be understood. This allows for everyone to address and think about the issue and it may inspire solutions that facilitate the trade-off between the dark and bright sides of blurring boundaries. One such solution is that of digital agents that could help handle questions of responsibility that are now blurring along with the boundaries giving rise to their attribution.

1.7 Literature

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